DELIVERY

Seed Systems and Private Seed Company Involvement in Biofortification

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Since beginning in 2003, HarvestPlus has cultivated strong partnerships with private sector seed companies to conduct research in developing, testing, and disseminating biofortified seed lines for future commercialization. Private sector partners are particularly important to product development and delivery in Zambia where three seed companies are currently engaged in the delivery of orange maize and in India where numerous seed companies are engaged in crop development and identifying the best performing varieties of pearl millet and wheat for commercialization. As HarvestPlus prepares to commercialize zinc wheat in India, two partners, Sri Sai Seeds and SRC Bioseed, have produced seed for use in test marketing. Iron pearl millet hybrid varieties will be commercialized beginning in 2014 by two private seed companies, Nirmal Seeds and Shakti Vardhak. Nirmal Seeds also distributes the first open-pollinated iron pearl millet variety throughout the state of Maharashtra in India.

Zambia Case Study

Three vitamin A hybrids were released in Zambia in 2012. Licensing of three released hybrids and allocation of hybrids is the subject of an MOU between the Zambia Agriculture Research Institute (ZARI) and three respective seed companies, Zamseed, Seed Co, and Kamano, with HarvestPlus involved as ''interested party.'' Differences in adaptive pattern facilitated negotiations and allocation of individual hybrids to these seed companies under an exclusive commercialization modality. In consensus, Hybrid GV664A was allocated to Zamseed, GV665A to Seed Co, and GV662A to Kamano Seed Company; these companies were/are engaged in vitamin A maize performance testing and the identification of leads for submission to official registration trials. In addition, commercial contracts with HarvestPlus specify obligations and responsibilities of the parties, seed production and monitoring, marketing and distribution arrangements and risk sharing.

Seed company partners receive breeder seed of parent lines from ZARI to initiate inbred line and F1 parent seed production and for line maintenance. HarvestPlus facilitates the initial production and marketing of the biofortified maize seed with the various seed companies through activities such as promotion of the hybrids during field days and agriculture shows in both pre- and post-commercialization of the maize varieties. After commercial introduction, seed companies monitor the market demand for hybrids and collect information from their retail outlets and field representatives to forecast and implement the subsequent seed production.

Seed companies in general do not produce seed during the winter off-season. Off-season seed production requires irrigation, costs are much higher compared to the regular season, production can be risky due to low temperatures, and the turn-around time between harvest and seed marketing is very short; furthermore, there is limited experience in off-season seed production. To increase the seed volume for 2012/13 season demonstrations and parental stocks, HarvestPlus contracted seed production during the 2012 winter season on a commercial farm. Seed production was below target due to irrigation management issues. Lesson learned were shared with seed company partners to be applied in future off-season seed production. In 2012/13, seed company seed production focused on bulking pre-basic and some basic seed for the large commercial rollout in 2014/15. In 2014, about 200 tons of seed is expected to be produced by Zamseed, while Kamano and Seed Co continue to multiply their parent lines for 2015 seed production. This seed from Zamseed is already targeted to various development agencies and farmers. Some development partners are invested in school feeding programs, while others will mobilize the crop for commercial processing by milling companies. Any remainder of the seed shall be distributed in the normal seed retailing outlets (agrodealer network) of seed companies. HarvestPlus supports the wider distribution and promotion of the orange maize seed with the distributing seed companies.

To test the market, HarvestPlus has been engaged since 2013 with a milling company (Star Milling) to produce orange maize flour for commercial marketing as a new product line for the company. The new brand of mealie meal sells under an orange label and has been available in commercial retail chain stores like Spar and Pick'n Pay. Maize used for this purpose has been mobilized from the early adopters of small producers in the facilitation districts. The test sales have been positive in ensuring future commercial sales and promotions. With the expected collaboration with other partners promoting the commercialization of vitamin A maize, HarvestPlus expects a great future for orange maize in terms of crop production, processing, and consumption in Zambia.

Challenges

- Bulking up of parent seed is slow to meet created demand.
    - *Recommendation:* Bulking of parent seed was extended to the off-season (winter) production in order to fast track the commercial production of the released varieties. In the future, seed company partners should be identified early so that parent line multiplication (prebasic and basic seed) can begin at the same time that a candidate variety is submitted for performance testing, regardless of whether some candidates may be dropped. This will allow for adequate production to meet expected demand for the varieties.
- Seed companies' capacity to maintain parent lines is limited.
    - *Recommendation*: Seed companies that may not have the facilities and capacity to maintain the parent lines of a licensed variety should be supported by services from the National Research System. If such capacity is wanting, services of a nearby CGIAR center should be sought to uphold the integrity (genetic purity) of the variety and the exclusivity to the variety by the seed business.
- Differentiation of vitamin A orange maize from yellow maize is needed in the markets.
    - *Recommendation:* Because not all yellow or orange maize varieties contain high levels of provitamin A (especially beta-carotene), it is important to develop innovative ways to differentiate vitamin A maize from ordinary yellow or orange maize. Strong branding with the HarvestPlus brand that has become synonymous with biofortification would be required for vitamin A maize products.